

- 1        1. A method comprising:
  - 2            producing hydrocarbons from a subsea well in an
  - 3            underbalanced condition using a rotating head mounted on a
  - 4            surface blow out preventer.
- 1        2. The method of claim 1 including using the surface  
2        blow out preventer to provide surface flow control.
- 1        3. The method of claim 2 including providing a  
2        subsurface blow out preventer in addition to said surface  
3        blow out preventer.
- 1        4. The method of claim 3 including providing  
2        subsurface shear blow out preventers.
- 1        5. The method of claim 1 including coupling said  
2        surface blow out preventers to the wellhead using casing  
3        and providing a remotely operable subsurface latch to sever  
4        the connection between said wellhead and said surface blow  
5        out preventers.
- 1        6. The method of claim 5 including tensioning said  
2        casing.
- 1        7. The method of claim 5 including providing a flow  
2        of mud through a casing to a drill bit.

1       8. The method of claim 7 including lowering the  
2 density of mud returning from said drill bit through said  
3 casing.

1       9. The method of claim 8 including providing a  
2 separate line to enable fluid to be pumped from the surface  
3 to a subsurface location to lower the density of the  
4 returning mud.

1       10. The method of claim 9 including providing a  
2 tensioned line to provide said fluid from said surface.

1       11. The method of claim 10 including providing a  
2 disconnectable latch to disconnect the line from the  
3 wellhead.

1       12. The method of claim 11 including providing a  
2 subsurface blow out preventer and providing said line to  
3 said subsurface blow out preventer.

1       13. The method of claim 12 including providing a pair  
2 of shear ram subsurface blow out preventers and pumping  
3 said fluid between said shear blow out preventers.

1       14. The method of claim 13 including providing a  
2   remotely operable valve to control the flow of said fluid  
3   and positioning said valve at a subsea location.

1       15. The method of claim 1 including providing a  
2   rotating head that transfers rotational energy to said  
3   drill string through a packer.

1       16. The method of claim 15 including providing said  
2   rotational energy through a resilient packer.

1       17. A drilling rig comprising:  
2              a rotating head;  
3              a surface blow out preventer mounted under said  
4   rotating head on said rig; and  
5              an apparatus to pump fluid to a subsea location  
6   to lower the density of drilling mud returning to said rig.

1       18. The rig of claim 17 including a casing coupled  
2   from said surface blow out preventer to a subsea subsurface  
3   blow out preventer.

1       19. The rig of claim 18 wherein said subsea blow out  
2   preventer includes a pair of shear blow out preventers.

1       20. The rig of claim 19 including a remotely operable  
2 latch to sever said casing from said subsea blow out  
3 preventer.

1       21. The rig of claim 20 wherein said casing is  
2 tensioned.

1       22. The rig of claim 17 including a separate line to  
2 supply lower density fluid to a subsea location to lower  
3 the density of drilling mud to be returned to said rig.

1       23. The rig of claim 22 wherein said line is  
2 tensioned.

1       24. The rig of claim 23 wherein a disconnectable  
2 latch is provided to disconnect the line at a subsea  
3 location.

1       25. The rig of claim 17 including a subsurface blow  
2 out preventer and a coupling to receive said line.

1       26. The rig of claim 25 wherein said subsurface blow  
2 out preventer includes a pair of shear ram subsurface blow  
3 out preventers and said coupling is arranged between said  
4 pair of shear ram subsurface blow out preventers.

1       27. The rig of claim 26 including a valve in said  
2 line to control the flow of fluid to lower the density of  
3 said drilling mud.

1       28. The rig of claim 17 wherein said rotating head  
2 includes a resilient packer and a drill string and tubing,  
3 said resilient packer to seal the region between said drill  
4 string and said tubing and to transfer rotational energy  
5 from said tubing to said drill string.

1       29. The subsea shutoff assembly comprising:  
2              a pair of shear blow out preventers; and  
3              a device coupling said blow out preventers, said  
4 device having an inlet to receive a density lowering fluid  
5 to lower the density of drilling mud moving upwardly  
6 through said device.

1       30. The assembly of claim 29 including a line for  
2 supplying density lowering fluid, said line including a  
3 remotely actuatable valve.

1       31. The assembly of claim 30 wherein said valve  
2 automatically closes upon loss of control.

1       32. A method comprising:  
2              operating a subsea wellhead in an underbalanced  
3 condition;  
4              providing mud at a first density to said  
5 wellhead; and  
6              injecting, from the sea surface, a first density  
7 lowering fluid, into mud returning from said wellhead,  
8 through tensioned, latched tubing.

1       33. The method of claim 32 including producing  
2 hydrocarbons from a subsea well in an underbalanced  
3 condition using a rotating head mounted on a surface blow  
4 out preventer.

1       34. The method of claim 33 including using the  
2 surface blow out preventer to provide surface flow control.

1       35. The method of claim 34 including providing a  
2 subsurface blow out preventer in addition to said surface  
3 blow out preventer.

1       36. The method of claim 35 including providing  
2 subsurface shear blow out preventers.

1       37. The method of claim 32 including providing a  
2 separate line for said first density lowering fluid to be  
3 pumped from the surface to a subsurface location mud.

1       38. The method of claim 37 including providing a  
2 subsurface blow out preventer and providing said line to  
3 said subsurface blow out preventer.

1       39. The method of claim 38 including providing a pair  
2 of shear ram subsurface blow out preventers and injecting  
3 said first density lowering fluid between said shear blow  
4 out preventers.

1       40. The method of claim 39 including providing a  
2 remotely operable valve to control the flow of said fluid  
3 and positioning said valve at a subsea location.

1       41. The method of claim 33 including providing a  
2 rotating head that transfers rotational energy to said  
3 drill string through a packer.

1       42. The method of claim 41 including providing said  
2 rotational energy through a resilient packer.

1       43. A system for supplying density lowering fluid to  
2 a subsea location comprising:

3              a surface hanger to tension and hang tubing  
4 connectable to a source of density lowering fluid; and  
5              a subsea latch to couple a first portion of said  
6 tubing to a second portion of said tubing, said latch being  
7 remotely operable to disconnect said first portion of said  
8 tubing from said second portion of said tubing.

1       44. The system of claim 43 including a subsea valve  
2 to control the rate of flow of fluid through said tubing.

1       45. The system of claim 44 wherein said valve is  
2 coupled to a connector to couple said tubing to a subsea  
3 location.

1       46. The system of claim 43 including a subsea shutoff  
2 assembly coupled to said tubing.

1       47. The system of claim 46 wherein said subsea  
2 shutoff assembly includes a pair of shear ram blow out  
3 preventers coupled to one another.

1       48. The system of claim 47 including a coupling to  
2 connect said shear ram blow out preventers to one another,  
3 said coupling adapted to receive said tubing, said coupling  
4 to pass drilling fluid downwardly through a central passage  
5 and upwardly through a radially displaced passage.

1       49. The system of claim 43 wherein said latch  
2 disconnects upon detection of a failure.

1       50. The system of claim 43 wherein said hanger  
2 includes a hydraulic ram to grip said tubing.